Rapid (local) management responses to coral bleaching

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Context for this talk:

Other talks …

- Risk and resilience
- MPA design
- ICM and other models
- Communications
- Biomarkers/indicators

… what can you do in the short term?

Immediate Objectives:

- **reduce threats**
- **Increase resilience**

Questions such as …

- **Should you try to divert dive operators and other reef users?**
- **Should you establish temporary no-take areas around bleaching reefs to promote recovery?**
- **How to establish monitoring - long term and rapid response?**

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Management of Bleached and Severely Damaged Coral Reefs. 2000. Susie Westmacott, Kristian Teleki, Sue Wells, Jordan West.
IUCN, CBD, USAID, WWF

- Marine Protected Areas (MPAs)
- Reef fisheries management to preserve ecosystem function
- Tourism management to reduce impacts
- Integrated Coastal Management (ICM)
- Restoration and rehabilitation in an appropriate context.

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Global climate change is multi-faceted …

- **Temperature and radiation increase**
- Severe weather events
- Sea level rise
- Calcification rate reduction
- Ocean circulation pattern alterations

Temperature is the primary immediate threat

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Temperature stress is not the only threat causing coral bleaching and/or reef degradation …

- Fisheries:
  - Overfishing leads to algal dominance
  - Destructive methods directly affect corals
- Tourism:
  - direct damage by divers
  - impacts of development
- Coastal zone development:
  - coastline hardening
  - pollution
  - eutrophication

A complex trophic web may provide resilience mechanisms that we do not yet understand

Key concepts of resilience and ecological complexity

… and … interventions based on other/multiple threats

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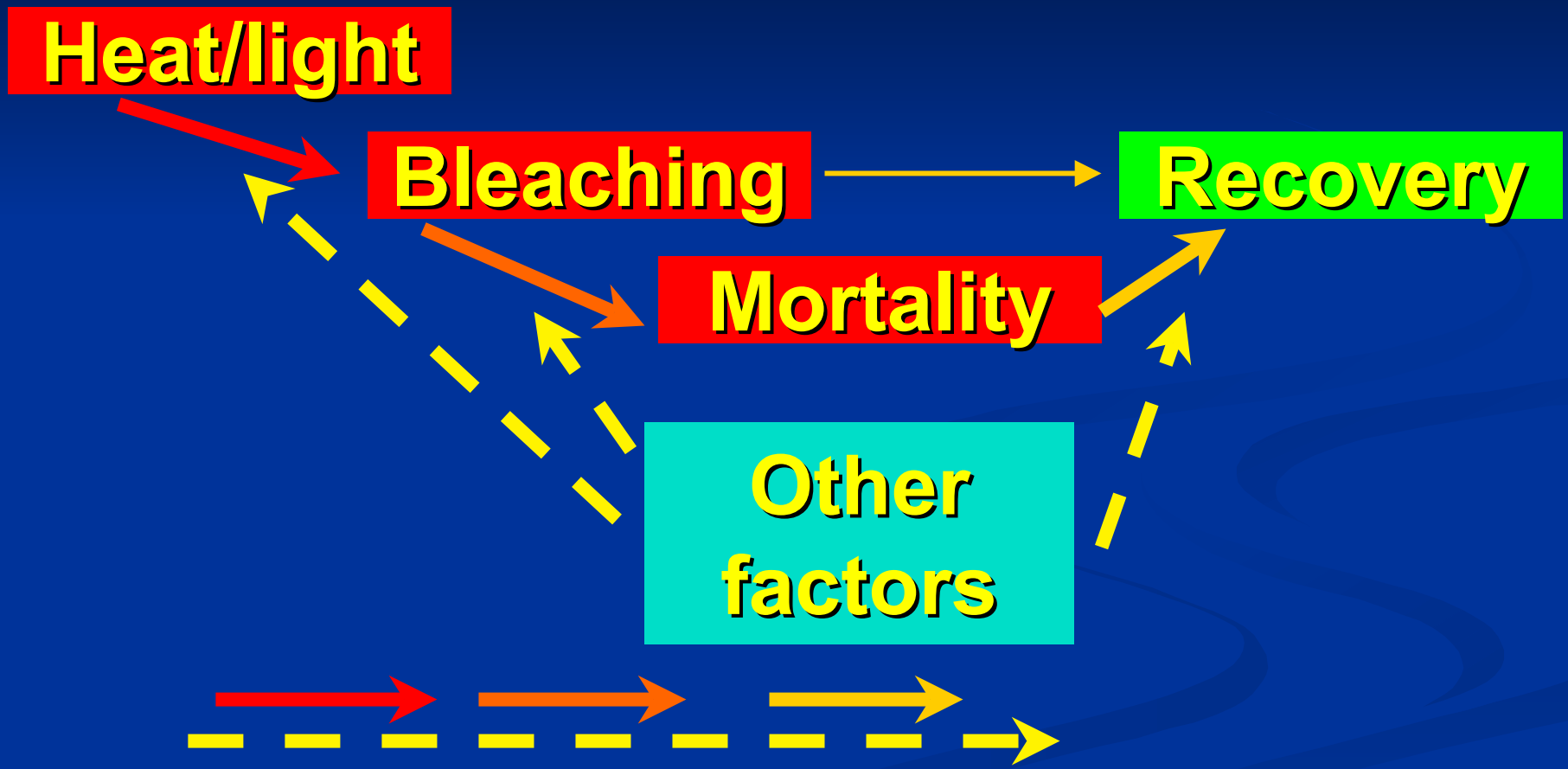
Loci for management actions:



Increasing potential for management influence???

Increasing importance of resilience???

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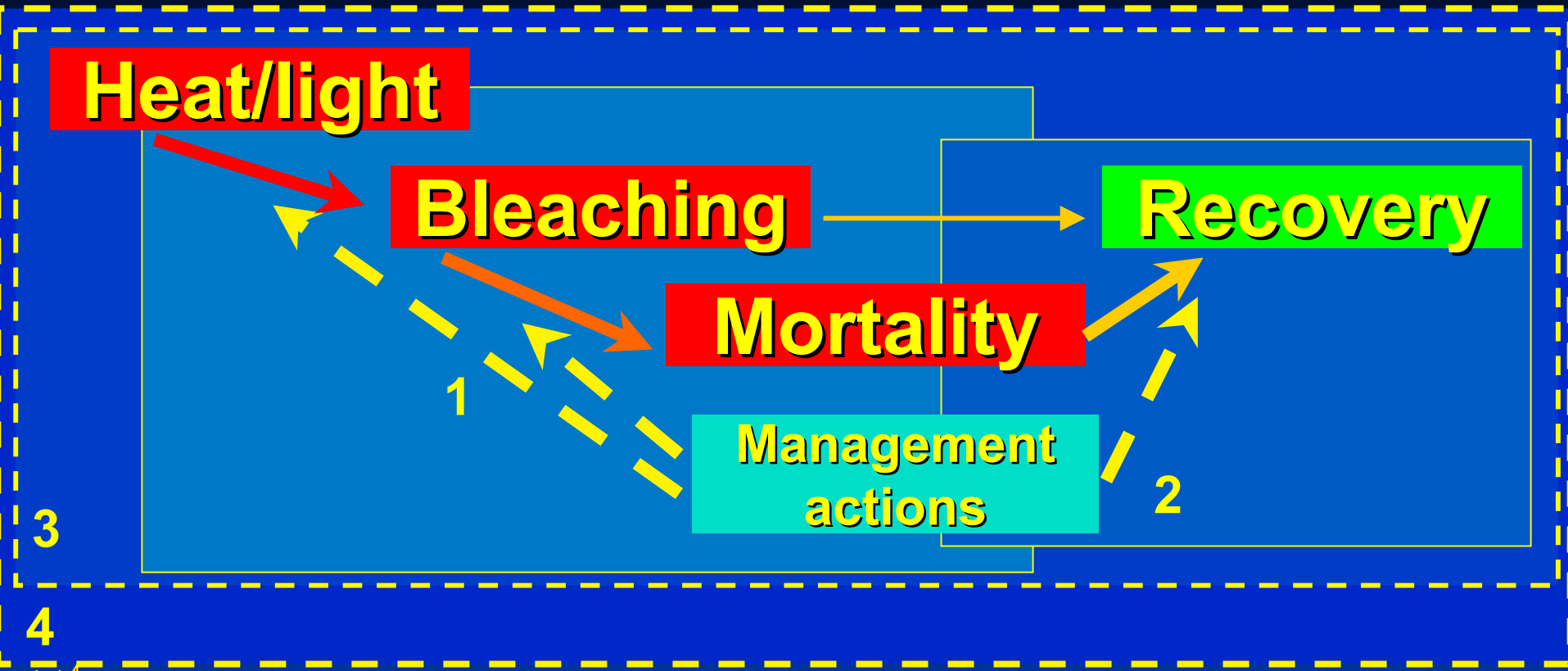
Principles for intervention:



1 - Reducing threats and impacts

2 - Restoration and rehabilitation

3 - Monitoring and evaluation

4 - Communications, awareness, stakeho

What?

- reduce threats
- Increase resilience

Understand what's happening

1. Reducing impacts and threats

Apply the precautionary approach –

? a) remove primary threat – political/national/global

b) remove secondary and interacting threats – local/regional

? c) relieve symptoms and/or treat the condition (bleaching, mortality) – local

d) zoning and protection for

- source and/or least damaged sites, and/or
- stressed and damaged sites

e) improve overall effectiveness of management

f) embed local management in larger scale networks and/or ICM strategies

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Looking further at:

b) remove secondary and interacting threats – local/regional

d) zoning and protection for

- source and/or least damaged sites, and/or
- stressed and damaged sites

The current set of rapid management responses relate to interactions with other threats on bleaching and recovery:

- **Should you try to divert dive operators and other reef users?**
- **Should you establish temporary no-take areas around bleaching reefs to promote recovery or is this unnecessary?**

Key ingredient for success – #4 - Communications, awareness, stakeholder involvement

- **facilitates management responses, especially where conflicts exist between stakeholders**

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3. Monitoring and evaluation

To identify which management actions DO help, monitoring and evaluation are high priorities.

Components of a monitoring programme:

a) Direct relation to management objectives
b) Multiple scales in space and time
c) Include appropriate indicators
d) Include rapid response protocols
e) Include participation by stakeholders and others
f) Embed in larger scale environmental mapping context
g) Embed in a research and analytical framework

Establish a supportive public and stakeholder environment
Establish a supportive policy environment

… and …

Use an experimental, analytical approach

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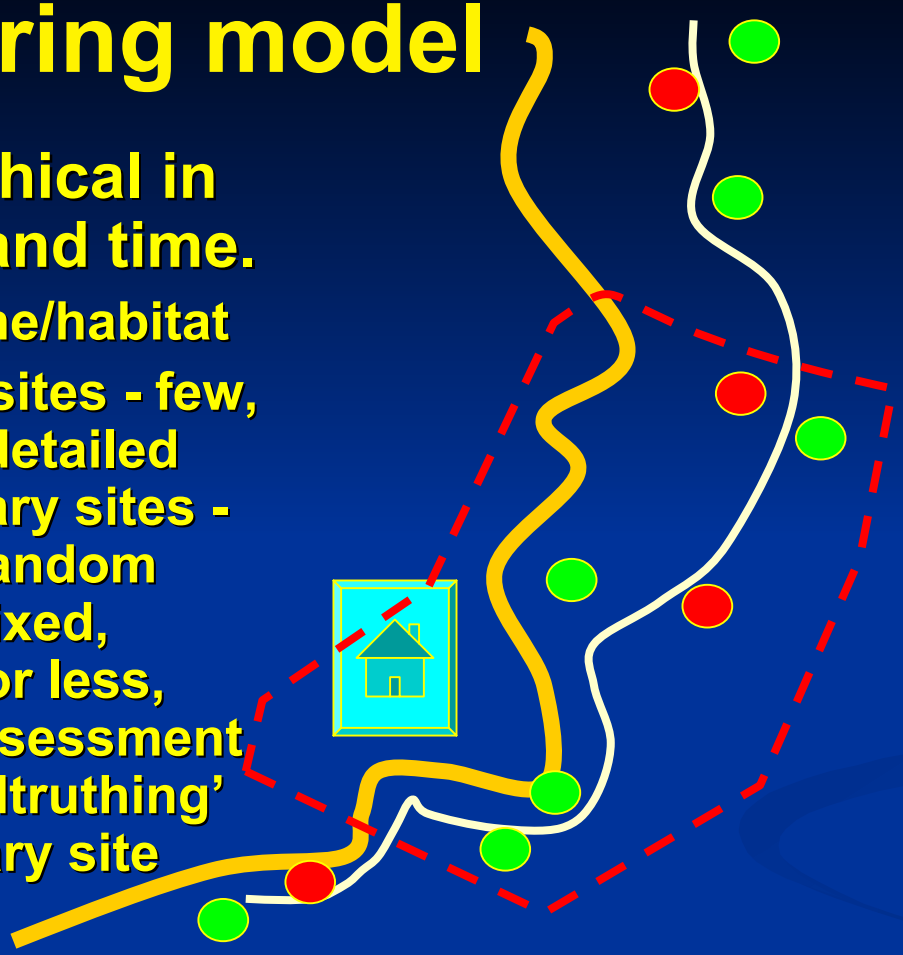
Monitoring model

a) Hierarchical in space and time.

- Multi-zone/habitat
- primary sites - few, annual, detailed
- secondary sites - many, random and/or fixed, annual or less, rapid assessment ('groundtruthing' of primary site trends)



b) appropriate indicators and methods

- general
- coral
- zooxanthellae

d) objectives

- Immediate management purposes
- Scientific monitoring

c) rapid response

- specific subset of the full programme
- adapted for speed, coverage and relevance
- accelerated sampling intervals (e.g. 2-4 weeks for 3-6 months for bleaching event.)

"Participatory" monitoring for management

Hierarchy in effort.

- detailed sites
- participatory sites

- Management staff
- Dive operators
- Schools/colleges
- Fishermen
- General Public

Scaling of effort and indicators

- Type and number of samples
- Methodology issues
- Hierarchical levels of identification
- Temporal and spatial resolution and extent

Objectives

- To gather data where it would not otherwise be obtained.
- To extend the temporal and spatial coverage of more detailed sampling.
- As a communication and empowerment tool.

What management benefits?

- Awareness and communications tool
- Builds investment in environment
- Facilitates decision-support system
- Builds local constituency for political action

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Build a portfolio of tools for rapid management responses

- **Management plan:**
  - contingency, procedures, threshold responses
  - monitoring plan - methods, evaluation and decision making steps
  - funding - for annual monitoring

- **Contingency funds:**
  - for rapid response monitoring
  - for management responses specified in management plan
  - for communications to stakeholders and others

- **Collaborative model:**
  - Partnership approach – public and stakeholder support
  - Joint responsibilities
  - Supportive policy environment, build a constituency for political action

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The effects of management responses to bleaching events have not yet been documented and analyzed – testing is needed.

So …

- Should you try to divert dive operators and other reef users?
- Should you establish temporary no-take areas around bleaching reefs to promote recovery or is this unnecessary?

Try them …

- In a collaborative management framework
- Based on scientific hypotheses
- Under a monitoring and evaluation framework

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Conclusion …

Objectives:

- reduce threats
- Increase resilience

A new and explicit framework is necessary for developing and testing effective management responses for coral reefs in the face of climate change.

The tools ….(Westmacott et al. 2000)

- **Marine Protected Areas (MPAs)**
- **Reef fisheries management to preserve ecosystem function**
- **Tourism management to reduce impacts**
- **Integrated Coastal Management (ICM)**
- **Restoration and rehabilitation in an appropriate context.**

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A sea change …

- **‘stewardship’ principle?**
- **experiment with management interventions**
- **monitor and evaluate the efficacy of trial interventions**
- **build partnerships and constituencies of support**

- **Management – science engagement.**
  - ‘applied’ research and experimental management
  - Use latest science, products and knowledge
  - Monitoring, documentation, evaluation
  - **Specific commitments to action based on information**

- **Stakeholder engagement – Communication, action**
  - Participation/involvement in monitoring, use of information, management and evaluation
  - **Constituency for political action**

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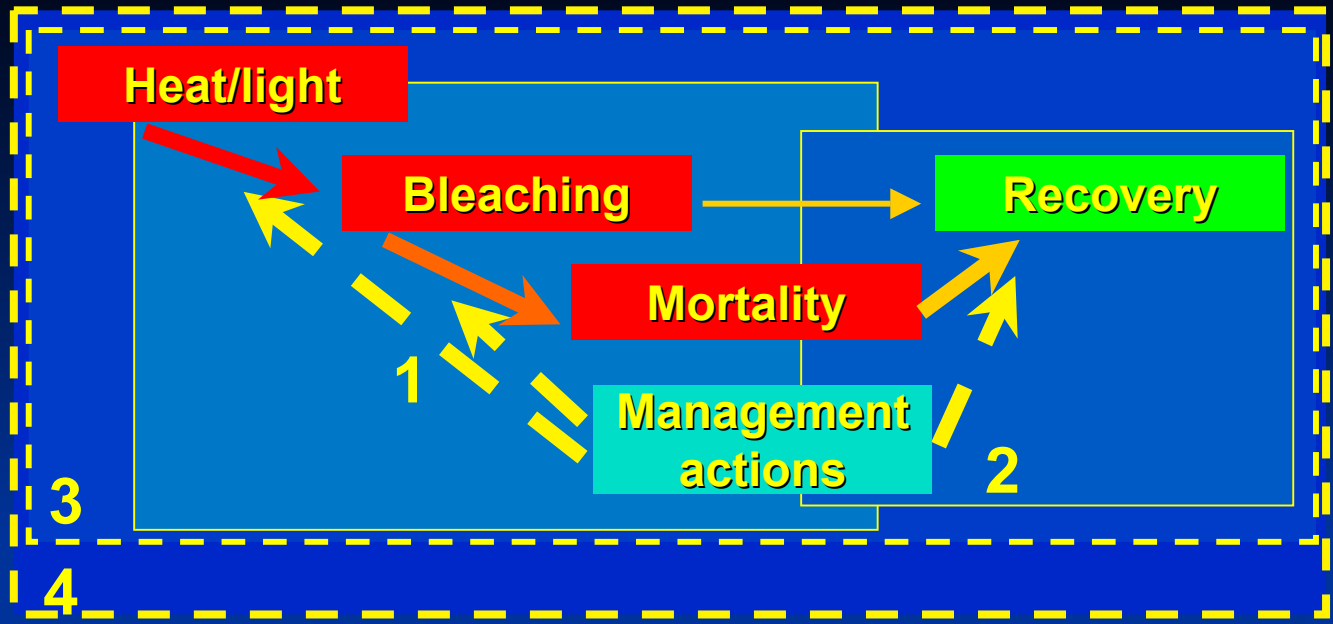
Rapid/local Management Responses

1. Reducing threats and impacts



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Rapid/local Management Responses

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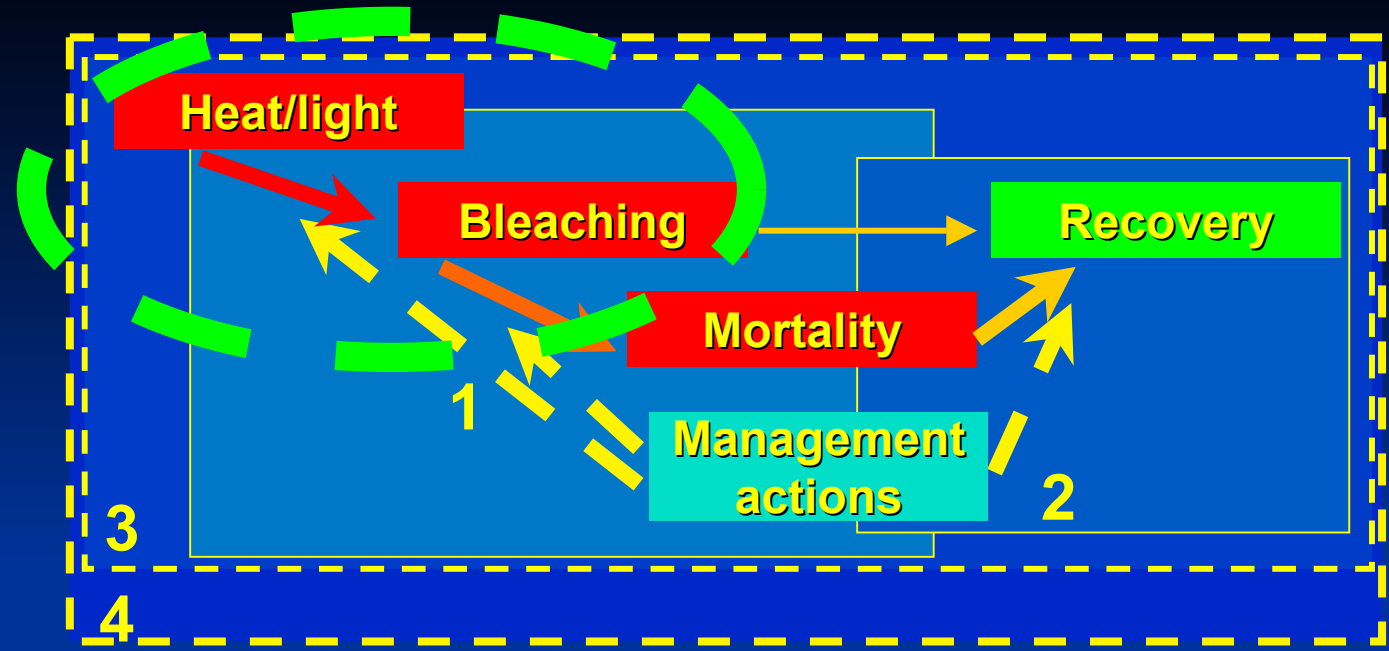

a) remove primary threat

What?

- reduce threats
- Increase resilience

- Leadership …
- Optimistic scenarios give room for options
- Local management and action empower political process

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